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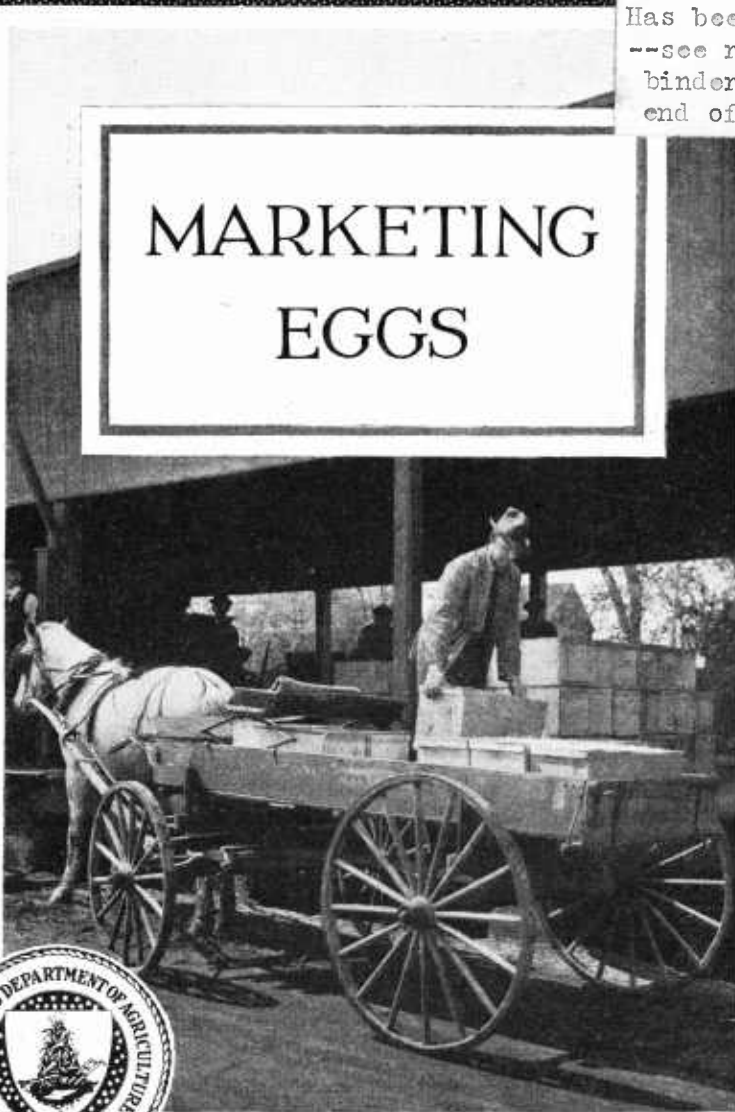
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U. S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN No. 1378

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MARKETING EGGS



THE EGG.

Quality is the great factor in market value.

A good market egg requires—

Good production methods on the farm.

Good handling methods during its journey to market.

Speed of delivery from the hen to the consumer.

The best method of marketing for each producer depends upon—

Volume of egg production.

Proximity to consuming centers.

Shipping facilities.

Cost of transportation service.

Available buying or marketing agencies.

Time and labor costs required in preparation and delivery.

MARKETING EGGS

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CONTENTS.

	Page.		Page.
Where eggs are produced.....	1	Candling.....	12
The problem of transportation.....	3	Grading.....	16
Seasonal production.....	3	Commercial grades.....	17
The function of cold storage.....	4	Egg packages.....	19
Marketing methods.....	6	Packing eggs.....	22
Market channels.....	6	Shipping eggs.....	24
Egg structure and composition.....	8	Preservation and cold storage of eggs.....	26
Factors affecting quality.....	10	Points for the producer to remember	
Farm care essential to good quality.....	12	in marketing eggs.....	27

MORE THAN FIVE MILLION FARMS in the United States produce eggs. These comprise a large majority of the farms in every State. On most of these farms egg production is a side line and the surplus available for market is small, but the total surplus of these farms is sufficient to supply the needs of an urban population of more than 54,000,000 people.

The estimated production and value of eggs in the United States for 1922 are as follows:

Chicken eggs.....dozen..	1, 962, 356, 000
Other eggs.....do.....	6, 004, 000
Value of chicken eggs.....	\$500, 008, 000
Value of other eggs.....	\$2, 693, 000
Total value of eggs.....	\$502, 701, 000

WHERE EGGS ARE PRODUCED.

Specialized poultry farms, on which the production of market eggs is the chief activity, are much less numerous than farms with a general farm flock. Specialized egg farms are located in greatest numbers along the Atlantic coast, in close proximity to the great consuming centers, and along the Pacific coast, where climatic conditions are especially favorable. They are found in smaller numbers close to large cities and scattered generally throughout all of the United States. Because of their smaller numbers, the egg production of specialized poultry farms is much less than that of general farms. (See fig. 1.)

While there are areas of intensive egg production in the East and on the Pacific coast, the greater supply is produced in the eastern North-Central and western North-Central States. According to the census for 1919, Iowa led with an annual production of 120,000,000 dozen, followed in order by Missouri, Illinois, Ohio, Indiana, Kansas, Pennsylvania, Texas, California, and New York.

Not only do the middle Western States produce more eggs but because of a smaller urban population they have a greater surplus available for shipment to eastern markets. The origin of eggs received in New York, Chicago, Philadelphia, Boston, and San Francisco markets, shown in Table 1, clearly indicates the importance of each State as a surplus producer of eggs.

The smaller cities obtain their supply of eggs in large part from the producing territory immediately surrounding them, but the larger cities must draw most of their needed supply from more remote producing sections. The larger the city, such as New York or Boston, and the more extensive the suburban population, the greater becomes the problem of obtaining a supply, and the necessity that a part of the supply be secured from greater distances.

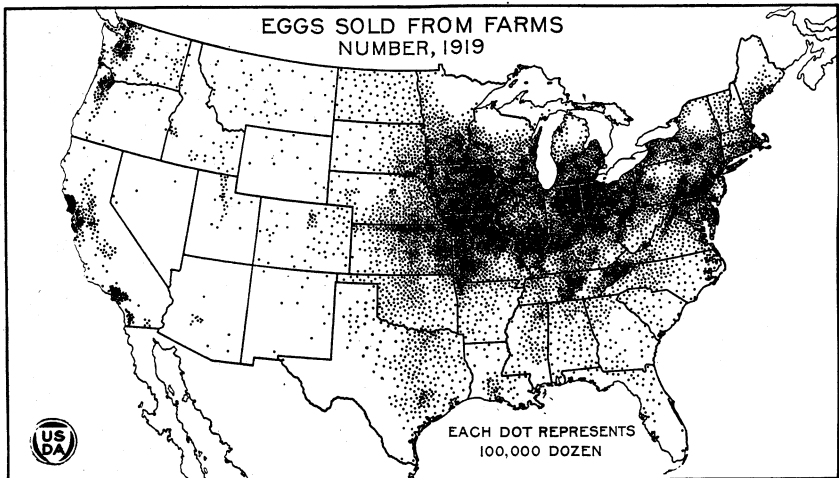


FIG. 1.—Egg production is widely distributed and the commercial receipts are gathered from many States.

While practically all of the surplus eggs produced in New York, New Jersey, and Pennsylvania are sent to New York City, the quantity shipped to that market from these States is but little more than 10 per cent of the yearly supply. The greater portion comes from the Middle West and, to a less extent, from the Pacific coast, and the Southern States, as shown in Table 1.

TABLE 1.—Number of cases of eggs received at the five principal markets from different States during 1922.

[A carload of eggs consists of approximately 400 cases.]

Origin.	New York.	Chicago.	Phila- delphia.	Boston.	San Francisco.	Total.
Alabama.....	7,938	495	2,586	0	0	11,019
Arkansas.....	8,825	13,604	5,800	0	0	28,229
California.....	354,068	0	0	0	822,913	1,176,981
Colorado.....	0	5,509	0	0	0	5,509
Connecticut.....	4,429	0	0	0	0	4,429
Delaware.....	51,506	0	46,200	0	0	97,706
District of Columbia.....	9,422	0	25	0	0	9,447
Georgia.....	2,391	0	0	0	0	2,391

Marketing Eggs.

3

TABLE 1.—Number of cases of eggs received at the five principal markets from different States during 1922—Continued.

Origin.	New York.	Chicago.	Phila- delphia.	Boston.	San Francisco.	Total.
Idaho.....	0	0	0	0	2,380	2,380
Illinois.....	1,378,846	310,494	273,784	709,510	0	2,672,634
Indiana.....	726,323	9,312	149,119	320,303	0	1,205,057
Iowa.....	921,046	843,515	70,921	141,971	0	1,977,453
Kansas.....	221,829	532,362	47,928	83,347	0	885,466
Kentucky.....	143,380	17,645	14,829	20,040	0	195,894
Maine.....	0	1,600	0	98,734	0	100,334
Maryland.....	83,611	0	67,546	78	0	151,235
Massachusetts.....	8,574	0	2,458	24,039	0	35,071
Michigan.....	99,713	18,030	145,183	42,482	0	305,408
Minnesota.....	217,004	461,594	62,639	108,021	0	849,258
Mississippi.....	3,713	11,553	11,128	0	0	26,394
Missouri.....	437,529	1,045,189	152,184	99,680	0	1,734,582
Montana.....	0	893	0	0	0	893
Nebraska.....	37,517	352,119	14,823	19,048	0	423,507
New Hampshire.....	0	0	0	38,463	0	38,463
New Jersey.....	134,279	0	2,223	0	0	136,502
New York.....	490,801	784	17,448	40,091	0	549,124
North Carolina.....	4,141	0	801	0	0	4,942
North Dakota.....	0	22,948	425	386	0	23,759
Ohio.....	514,248	1,648	148,800	108,429	0	773,125
Oklahoma.....	15,430	103,382	2,805	7,107	0	128,724
Oregon.....	14,911	0	0	0	7,280	22,191
Pennsylvania.....	265,014	1,404	146,912	4,893	0	418,223
Rhode Island.....	2,648	0	0	1,234	0	3,882
South Dakota.....	30,066	404,742	14,270	9,349	0	458,427
Tennessee.....	251,241	25,710	61,015	7,234	0	345,200
Texas.....	65,036	22,192	10,934	0	0	98,162
Vermont.....	0	0	0	37,170	0	37,170
Virginia.....	64,604	0	143,880	0	0	208,484
Washington.....	143,175	3,200	600	0	5,357	152,332
West Virginia.....	6,842	0	26,666	0	0	33,508
Wisconsin.....	53,681	473,819	28,853	10,999	0	567,352
Canada.....	12,829	0	0	2,748	0	15,577
Miscellaneous ¹	34,469	158	34,152	34,798	0	103,577
Total.....	6,821,079	4,683,901	1,706,937	1,970,154	837,930	16,020,001

¹ Under miscellaneous is included small daily shipments received from different States.

THE PROBLEM OF TRANSPORTATION.

Where eggs are produced from small flocks in sections located a long distance from market it is necessary that they be assembled and packed properly in large lots for economical handling and shipment. Therefore the business of the egg buyer and shipper became necessary.

The egg is a delicate, fragile food product, subject to rapid deterioration under unfavorable conditions. Moreover, shipments to the large eastern markets from the Middle Western States, where the great bulk of eggs are produced, must travel an average of over 1,000 miles. This indicates the need of refrigerator cars for shipping the eggs and the general scope and complexity of the transportation problems involved. The Interstate Commerce Commission reported that in 1921 class I railroads of the United States carried over 47,000 cars of eggs alone.

SEASONAL PRODUCTION.

If eggs were produced at an even rate throughout the entire year, the supply would be uniform and continuous and the problem of marketing much simplified. But the production is highest during the spring and early summer months and gradually declines dur-

ing the fall, until it reaches its low point in November and December. This is well illustrated in Figures 2 and 3 by the receipts of eggs on the five markets.

THE FUNCTION OF COLD STORAGE.

The uneven seasonal production results in a surplus during the spring season and a corresponding scarcity during the fall and

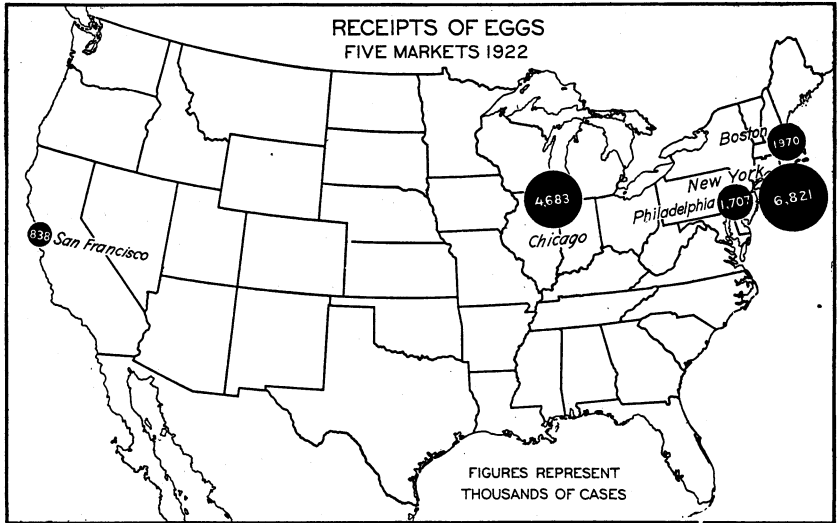


FIG. 2.—Receipts of eggs at the principal markets give some indication of the leading centers of consumption.

winter. It is one of the functions of the wholesale egg trade to equalize the supply and meet the demand at all seasons as nearly as possible. This is done by moving a part of the spring eggs

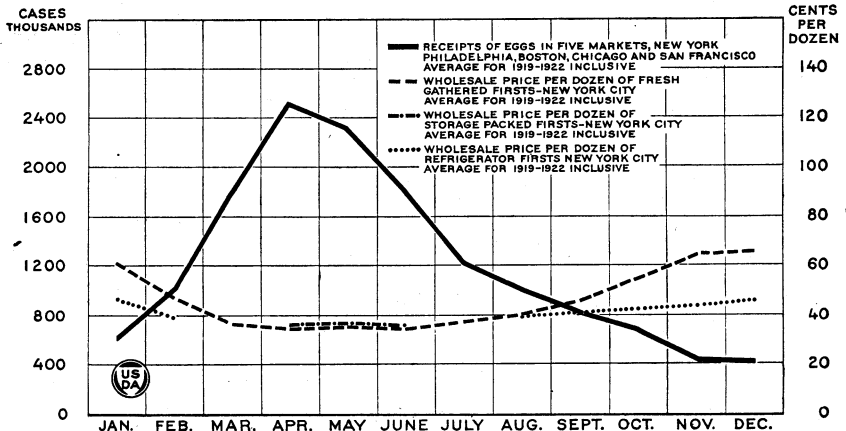


FIG. 3.—The price of eggs rises as receipts fall off and falls as receipts increase. Storage-packed eggs bring a slightly higher price, due to the better packing. The price of refrigerator eggs rises and falls with the price of fresh eggs, but within a narrower range.

through the usual channels for immediate consumption while the rest are carefully candled, packed in new cases, with new fillers and flats, and shipped to the larger cities, where they are placed in cold storage and held until fall and winter when there is a shortage of eggs. Eggs specially packed for storage in new cases made of odorless white wood, with new fillers and flats are called "storage packed" and sell for slightly higher prices per dozen than ordinary packed.

Approximately 12 per cent of the total annual production of eggs is stored. The season of storage begins in March, is most active during April and May, and continues at a lessened rate during June and July, and closes about August 1. Withdrawal of eggs from storage is slight in August, but gradually increases in September and October, is heaviest in November and December, and con-

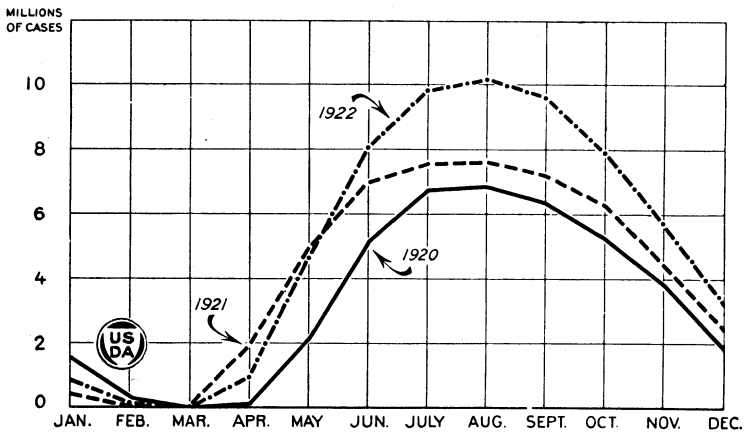


FIG. 4.—Cold-storage holdings of eggs in the United States, 1920-1922. Stocks of eggs normally begin to accumulate in storage in March, increase rapidly in April and May, more slowly in June and July, and reach their high point about August 1. The out-of-storage movement begins in August, gradually increases in September, and proceeds at its most rapid rate during October, November, and December. During January and February this movement gradually slackens until the egg storages are practically empty about March 1.

tinues through January and February until the stocks are practically exhausted by March 1 or earlier. (See fig. 4.) Apparently 40 to 50 per cent of the total annual holdings for the United States is stored in the five markets, New York, Chicago, Philadelphia, Boston, and San Francisco.

The holding of eggs in cold storage is a legitimate and needed market function which benefits both producers and consumers. Without cold storage eggs would hardly be worth enough in many localities in the spring to pay to gather them and in the fall the supply would be far from sufficient to meet the demand, and the price so high as to be prohibitive. Through the storage of eggs there is a demand in the spring for the surplus, resulting in attractive prices to the producers and in the fall and winter a large supply of wholesome storage eggs is made available at prices within the reach of consumers. At the same time the demand for new-laid eggs is sufficient to maintain a price on them at a level which makes winter egg production profitable.

MARKETING METHODS.

The marketing methods employed between producer and consumer may be relatively simple or decidedly complex. The care, handling, and promptitude associated with each method has a decided effect upon the quality of the eggs and therefore upon the satisfaction which they afford the consumer, and, incidentally, upon the price paid to the producer.

Egg-marketing methods may be divided into three groups: Direct, indirect, and intermediate. Direct marketing is the sale of eggs by the producer to the consumer. Indirect marketing is the sale of eggs by the producer to various agencies which in turn sell to packers or concentrators. By this method the eggs pass through a series of agencies and may be in trade channels for several weeks or longer before they reach the consumer. Intermediate marketing is a method

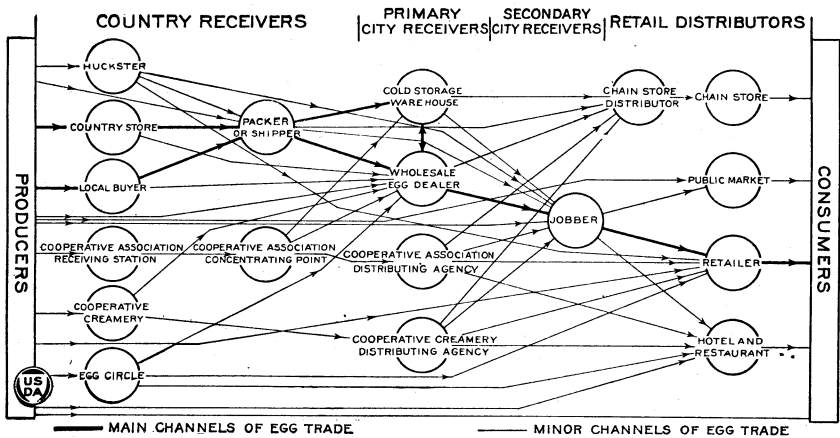


FIG. 5.—Eggs reach their final market through numerous channels.

by which the producer sells to dealers in the consuming market, the eggs passing through the hand of one or more dealers before they reach the consumer. (See fig. 5.)

MARKET CHANNELS.

PRODUCER TO CONSUMER.

As a rule, direct marketing from the producer to the consumer involves a considerable number of small sales at the best prices obtainable, and its continuance depends upon the delivery of a product of high quality. The question of whether the producer can afford to employ direct marketing methods depends upon his proximity to a consuming market and upon the time and expense entailed in establishing and maintaining a trade for all or a goodly portion of his product. To deliver eggs to the consumer the producer may make use of the parcel post, establish an egg route, deliver his own produce or depend upon sales at his own door.

PRODUCER TO RETAILER OR HOTEL.

Producers frequently sell to retailers or to hotel and restaurant trade. The prices paid are often nearly as good as for deliveries direct to the consumer, and this method has the advantage of fewer deliveries with a large volume in each. It is therefore a less expensive method of selling than direct to consumers. Deliveries to this trade are made by automobile truck, parcel post, or express shipments.

PRODUCER TO WHOLESALE DEALER.

A large number of producers sell their eggs to wholesale dealers, shipping one or more cases into the market by express. Such a method of sale requires considerably less effort for the producer, as he does not have to establish and maintain contacts with the consuming trade. On the other hand the return is somewhat less. When a reliable wholesale dealer is found this method of marketing is often very satisfactory.

COOPERATIVE MARKETING.

In certain sections of the country egg producers have formed cooperative marketing agencies, either because of the unsatisfactory prices which they have received, or because of an overstocked local market and the necessity of disposing of their surplus in distant markets. The smallest local cooperative marketing enterprise is the egg circle. In forming one of these circles several producers associate themselves together and pool their eggs for shipment to a common market, usually in small lots by express. Another plan of cooperative egg marketing consists of the utilization of the local cooperative creamery as a means of obtaining an outlet. As the farmers are already marketing their milk or cream through the creamery, it is comparatively easy to deliver their eggs at the same place and at the same time.

In certain sections, however, special marketing associations have been formed which handle the produce of a large number of producers. The eggs are generally gathered together at receiving stations, where they are carefully graded and shipped to market in car lots under refrigeration. The cooperative poultry and egg marketing associations of the Pacific coast are excellent examples of the successful operation of such a plan.

THE COUNTRY STOREKEEPER AND THE EGG PACKER.

Most of the commercial market eggs are produced on general farms in the Middle West. These eggs are to a large extent marketed through the country car-lot packer and shipper. This process involves the passage of the eggs through a relatively large number of hands. The farmer may take his surplus eggs to town when it is convenient and sell them to a local merchant for trade, or to a local egg buyer for cash. In some sections hucksters with wagons go through the country and purchase eggs at the farmer's door.

The custom prevalent in many sections of the Middle West with hucksters and local merchants of buying eggs on the "case count" basis is a practice most damaging to quality. When eggs are purchased on this basis, payment is made solely on the number of dozens of eggs delivered without regard to their quality or the percentage that are good or bad. Such a system offers no incentive to the careful farmer to produce good eggs, for he receives no more than the man who produces poor eggs. In the last few years there has been a decided tendency to substitute for the "case count" basis of buying, a "loss off" basis. Under the "loss off" basis no payment is made for eggs that are unwholesome and unfit for food and a difference based on quality may be made in the price paid for the good eggs. In some States laws have been enacted regulating egg buying and requiring that a "loss off" basis be used.

The country merchant or storekeeper and the local egg buyer ship the eggs to car-lot packers or shippers or to less than car-lot receivers in the market. However, a considerable time often elapses before these eggs are shipped and the conditions under which they are kept are often so unfavorable that a distinct deterioration in quality occurs. When eggs are received by an up-to-date car-lot packer and shipper they are immediately placed in refrigerated rooms where the temperature is between 35° and 40° F. and held until they are thoroughly cooled. Some of the smaller shippers are not so well equipped and the eggs may not be handled so well, but in any case they are candled, graded, repacked, and shipped by refrigerated fast freight or express, either in car lots or in less than car lots, to a large market where they go into consumptive channels immediately or are placed in storage for future sale. In the large markets the eggs are distributed by the receiver to retailers or to jobbers who in turn sell them to retailers.

When eggs are marketed through this channel, considerable time may elapse from the time the egg is laid until it reaches the consumer. Usually, it takes three weeks and in some cases considerably longer, especially when the eggs are held in cold storage for future sale.

EXCHANGE TRADING IN EGGS.

In the large egg markets, which includes practically all of the larger cities, exchange organizations composed mostly of wholesale dealers have formulated rules governing trading in eggs and other commodities for their members. These exchanges maintain a sales or auction room where wholesale trading in eggs is carried on each day and, on the basis of the offers, bids and actual sales market quotations are established. In Chicago, one of the greatest egg markets of the country, both spot and future sales are made on the exchange. Future sales are those which provide for delivery at some future date, while spot sales provide for immediate delivery.

EGG STRUCTURE AND COMPOSITION.

To understand the conditions or factors that may affect the quality of eggs their structure and composition should be reviewed. The yolk is suspended in the white at approximately the center of the egg

and is surrounded by the vitelline membrane. On the surface of the yolk and always on its upper side appears the germ or germinal spot. In some cases there may be more than one. In an infertile egg this germ spot is small and irregular in shape; in a fresh fertile egg it is round and larger. It is this germ which in a fertile egg develops into the embryo; the size of the germ spot therefore varies depending upon the extent to which this development has taken place.

The white consists of albuminous material which fills the space between the yolk and shell. It varies in density, being thickest in the portion near the yolk and thinnest in the portion next to the shell membrane. The white is clear and transparent except for two cloudy-white thickened portions resembling twisted cords which adhere to the yolk at the points nearest the ends of the egg. These cords are called chalazæ, and allow the yolk to rotate freely as the egg is turned but serve to retard the rise or settling of the yolk toward the

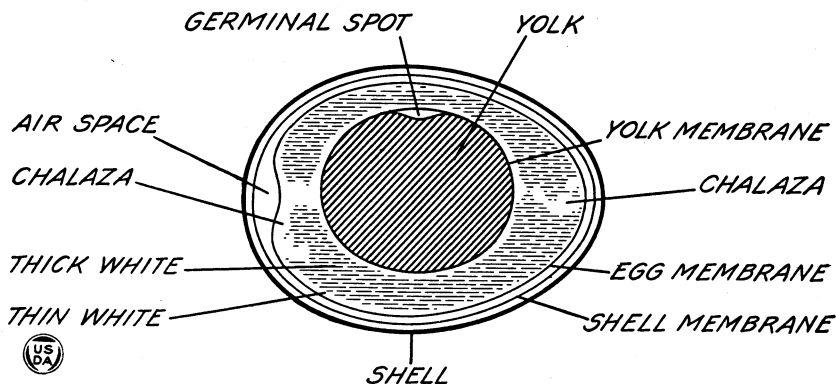


FIG. 6.—There are many parts of an egg.

shell when the egg is left in one position for any length of time. (See fig. 6).

The shell is composed largely of lime, is porous in structure, and allows the evaporation of water from the egg contents, the penetration of odors and flavors and, under unfavorable environment, the entrance of bacteria. Immediately lining the shell are two shell membranes which serve as a secondary protection to the contents. When the egg is first laid and is still warm, the contents entirely fill the shell. As the egg cools and the contents shrink a small air cell is formed between the two shell membranes usually at the large end where these membranes separate most easily. Evaporation of the contents takes place with the aging of the egg and the air cell gradually grows larger.

In the hen egg, the shell comprises about 11 per cent, the white about 57 per cent, and the yolk about 32 per cent of the entire weight. The composition of the egg, the egg white, and the egg yolk is given below. Although the eggs of other classes of poultry differ somewhat from hen eggs in their composition, this difference is small.

Composition of the hen egg.¹

	Refuse (mainly shell).	Water.	Protein.	Fat.	Ash.	Total. ²
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Whole egg.....	11.2	65.5	11.9	9.3	0.9	98.8
Whole egg (edible portion).....		73.7	13.4	10.5	1.0	98.6
Egg white.....		86.2	12.3	.2	.6	99.3
Egg yolk.....		49.5	15.7	33.3	1.1	93.6

¹ Langworthy, C. F., Eggs and their Value as Food, U. S. Dept. of Agr., Dept. Bull. 471 1917.

² The difference between these total percentages and 100 is made up of undetermined substances.

FACTORS AFFECTING QUALITY.

Eggs are a delicate and perishable food product, subject to rapid deterioration, susceptible to unfavorable surroundings, and liable to injury or loss by breakage. If eggs are to arrive in the hands of the consumer in good edible condition, and the enormous waste which now occurs because of deterioration and spoilage is to be diminished, they must receive intelligent care and handling from the time they are laid until they are eaten, and the whole marketing process must be expedited as much as possible.

Quality is determined by five primary factors: Condition of the shell, condition of the air cell, condition of the yolk, condition of the white, and condition of the germ. As all of these factors, except the shell, have to do with the interior of the egg, their condition must be determined by candling.

Shell.—In eggs of first quality the shell must be strong, sound (free from any cracks or checks), regular (free from abnormalities of structure, or mottling which may cause weakness), and must be clean. Strength and soundness are necessary to insure good shipping and good keeping quality. Cleanliness affects both price and keeping quality because dirty eggs spoil more rapidly.

Air Cell.—The air cell develops at the large end of the egg by separating the two shell membranes and filling this space with air. In eggs of best quality the air cell must be small, not over three-sixteenth of an inch in depth measured from the end of the shell to the bottom of the air cell space at the point of greatest separation of the membranes. The air cell should occupy a fixed position and not be movable. Large air cells are an indication of staleness or age, while movable air cells indicate broken membranes and detachment of the chalazæ permitting the yolk to settle and to stick to the shell.

Yolk.—The yolk of a fresh egg should be only dimly visible as a shadow when the egg is turned before the candle. It should have limited freedom of motion. Rapid and freer motion and greater visibility of the yolk is associated with lower quality. When broken out in a dish, the yolk of a fresh egg is well rounded or "stands up" well while the yolk of a stale egg is flatter and more spread out. The color of the yolk may vary all the way from a pale to a deep yellow. This depends largely upon the amount of green feed which the hens have received and therefore varies to a considerable extent with the season.

The color of the yolk may affect the price to a limited extent, especially where some special demand is to be met. Most consumers prefer a fairly deep-colored yolk, but there is a rather limited yet special demand in the New York City market for eggs with pale yolks.

White.—The white of an egg of extra quality should be firm and clear. Weak or thin white indicates staleness, while bloody white or the presence of any foreign substance such as a blood clot or pieces of tissue detached from the lining of the oviduct reduces the market value.

Germ Spot.—In a fresh egg the germ should show no visible development before the candle and even when the egg is broken out the germ spot should show little or no development. In fertile eggs subjected to a temperature of 72° F. or over, the development of the germ will proceed and the size of the spot may reach one-third

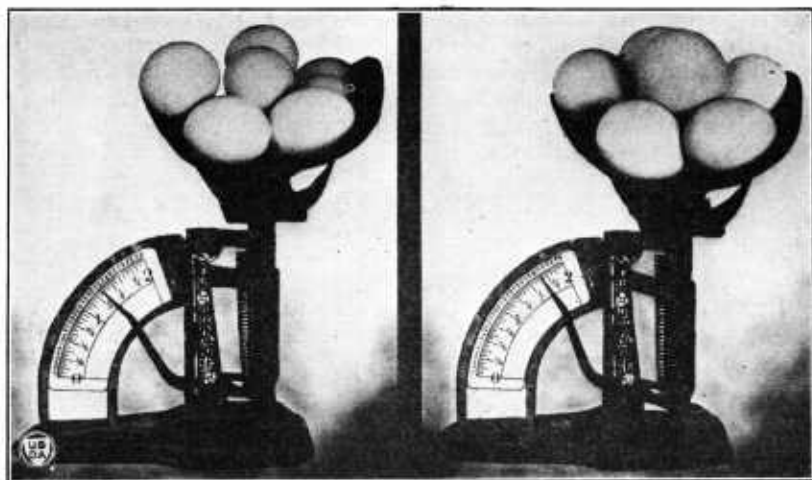


Fig. 7.—The food value of eggs varies in direct proportion to their weight. The dozen eggs on the left weigh 21 $\frac{1}{4}$ ounces, on the right 26 $\frac{3}{4}$ ounces. Their quality is identical. Should they be sold at the same price?

of an inch in diameter or even larger before any blood is shown. As soon as blood shows the egg is of course no longer edible. The development of the germ spot before this point is reached affects the quality adversely in proportion to such development.

Secondary Factors.—In addition to the primary quality factors mentioned, there are three secondary factors which affect quality, i. e., color, size, and weight. These factors may be determined without candling, do not affect the wholesomeness of the egg, but may affect its market price. Whether or not the shade of color will affect the price depends upon the market to which the eggs are consigned. For example, fancy eggs command a premium in the New York market if they are pure white in color while fancy browns command a premium on the Boston market. On any market, it is important that eggs be uniform in color, that is, all brown or all white, rather than brown and white mixed. A mixture of colors affects the appearance of the eggs as a lot and usually the price.

Uniformity in size also affects market price because a lot of uniform size presents a more pleasing appearance. Small sizes mixed with normal sizes are sure to detract from the market value. The small ones should be sorted out and used at home or marketed separately. Unusually large eggs marketed in standard packages are very liable to breakage, and are not only a loss in themselves but also smear and damage the other eggs.

Weight is a factor which affects prices, particularly if carried to an extreme in either direction. Often subgrades are recognized on the markets based on a minimum net weight per case. Since the food value of a dozen eggs is directly proportionate to their weight, it is obvious that weight should be a more important factor in fixing prices than it is at present. (See fig. 7.)

In addition to the factors already enumerated, eggs should be free from any abnormal flavor or odor. The most common abnormal flavors are sourness and mustiness, while foreign flavors may be absorbed from any strong-smelling materials near which the eggs are kept. It is impossible to detect these defects before the eggs are used, but care should be taken to prevent their occurrence by keeping the eggs under good conditions. Storage flavor is a common characteristic of under-grade eggs held in storage and of eggs held under improper storage conditions.

FARM CARE ESSENTIAL TO GOOD QUALITY.

Practically all eggs are of equally good quality when first laid. But if they are to retain their quality and reach the market in good condition they must be given proper care and handling by the producers. There is no process or step in marketing which can improve an egg of poor quality. All that can be done is to preserve the original quality. Good care on the farm is therefore a necessary prerequisite to the marketing of good eggs.

First of all it is necessary to have good poultry stock of a standard variety in order to produce eggs of uniform size and color. The flock must be well-housed, fed, and cared for in order to increase their productivity. As soon as the hatching season is over all male birds should be disposed of or separated from the flock so that only infertile eggs of superior keeping quality will be produced. Nests, clean and sufficient in number, must be provided in order that the largest possible percentage of the eggs may be kept clean. Dirty eggs should never be washed unless they are to go into channels of immediate consumption. Washing reduces the keeping quality and results in losses, especially if they are to be placed in storage.

Eggs must be gathered frequently, at least once a day, and preferably twice a day during very hot or very cold weather to prevent their becoming heated or frozen. They should be kept in a cool, moderately dry place to maintain their quality and to prevent mold development. All very small, very large, or very dirty eggs should be used at home or sold to local consumers and not included with those shipped to market.

CANDLING.

To determine the quality of eggs as shown by the condition of the air cell, yolk, white, and germ, it is necessary to candle them. Can-

dling consists of holding the egg before a strong light, usually artificial, in such a way that the rays of light penetrate the egg to a considerable extent, thus enabling the condition of the contents to be noted. Most producers do not candle eggs, although buyers and dealers find it advantageous to do so. Where a high-class retail trade is being catered to, candling by producers is a desirable and a necessary step, for sometimes absolutely fresh, new-laid eggs are unsuitable for food and if delivered will hurt the reputation of the producer. Such eggs are those with bloody whites, blood spots, and meat spots.

Candling should be practiced more generally by producers. Where it is done daily it is a short process on the average farm and will eliminate any eggs which are badly deteriorated and which should never find their way into the market egg basket.

Homemade egg cinders may be easily and cheaply made by using any light that is strong enough for the purpose. An electric light is best, but a good kerosene lamp, gas, or sunlight may be used. One of the simplest and most satisfactory homemade devices consists of a length of stovepipe with an electric light or kerosene lamp set inside. A round hole $1\frac{1}{4}$ inches in diameter should be cut directly on a level with the light. (See fig. 8.) A tin can having a removable top and large enough to take an incandescent lamp, with a $1\frac{1}{4}$ -inch hole opposite the light filament is another satisfactory homemade device where electric light is available. (See fig. 9.) Such candling devices should be used in a darkened room. A simple device for use outdoors consists of a long, heavy pasteboard tube like a mailing tube, large enough to admit the end of the egg. The eye is placed at the other end, and as the sunlight passes through the egg its condition is indicated.

In candling eggs, they are held in a slanting position with the large end against the hole through which the light passes. The egg is grasped by the small end, and while held between the thumb and tips of the first two fingers, it is given two or three quick turns on its long axis. (See fig. 10.) This moves the contents of the egg, and throws the yolk nearer the shell, allowing its condition to be more carefully observed.

The egg must be turned sufficiently so that all sides are exposed to the candler's view. Otherwise the only evidence of an undesirable condition might occur in that portion not observed by the candler and the egg would be misgraded. For the same reason, as little of the egg as possible should be obscured by the thumb and fingers holding it. The dark color of the shells of brown eggs makes them more difficult to candle than white eggs. An extensive and detailed

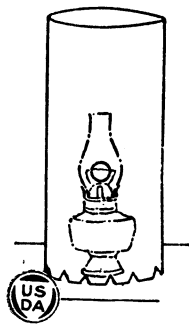


FIG. 8.—A length of stovepipe and a lamp or electric light are easily converted into an egg candle. A hole $1\frac{1}{4}$ inches in diameter should be cut opposite the light.

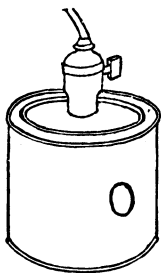


FIG. 9.—An electric light and a tin can with removable top make a cheap and easily constructed egg candle. A hole $1\frac{1}{4}$ inches in diameter should be made opposite the light filament.

knowledge of candling is not required by producers. They should be able to recognize a fresh egg from a stale egg and to distinguish undesirable qualities. In a fresh egg the air space is small, measuring not over three-fourths of an inch in diameter. The yolk is dimly visible, possesses limited freedom of motion, and shows no visible germ spot. The white is firm and clear and absolutely free of floating solid particles like meat spots or blood clots. (See fig. 11A.)

In a stale egg the air space is larger and may have an irregular movable lower outline. The yolk is plainly visible and moves freely. The white is thin and clear. (See fig. 11C.)

In a heated egg the germ spot is developed and the air space is usually enlarged although it may be comparatively small. The yolk is usually above the middle of the egg, is plainly visible, has a distinct reddish glow, moves freely, and has a visible germinal spot. (See fig. 11B.) If

blood veins or a blood ring is visible the egg is inedible. The white is thin and clear. Stale and heated eggs are, of course, of very poor quality.

A bloody white may be present in fresh eggs. Before the candle it may be distinguished by the red color of the white and often by irregular-shaped bodies or blood clots floating in the white or on the surface of the yolk.

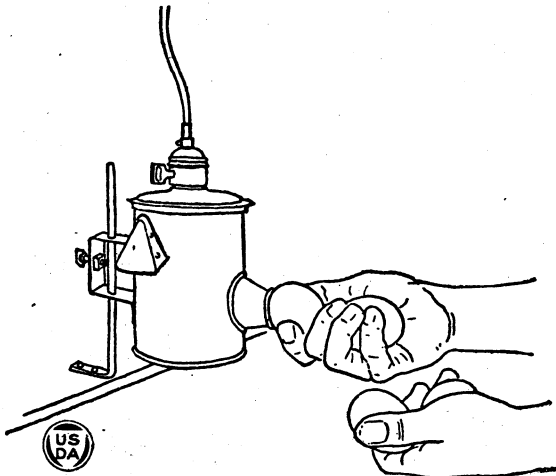


Fig. 10.—There is a best way to hold and handle eggs while candling.

Foreign material shows up as dark-colored particles in the white. Blood rings or veins indicate that the embryo has developed to the point where blood appears. If the embryo or germ has died the blood will have collected in a ring or circle known as a blood ring. (See fig. 12A.) Such eggs are common during hot weather where fresh fertile eggs are held at ordinary room temperatures for any considerable period of time. Eggs showing blood rings are inedible.

Various other classes of eggs are unsuitable for food, such as stuck yolks, moldy eggs, and rots. (See fig. 12B and C.) Most of these are easily distinguished from fresh eggs and are of interest to the producer only for the reason that they should be eliminated from the eggs sent to market. Often eggs have minute cracks or blind checks invisible to the naked eye but apparent before the candle. These should not be included with the market eggs but should be used at home, as they will not keep well and are easily broken.

All handlers of eggs from the producers to the city wholesalers should satisfy themselves of the quality of the eggs which they buy, or which they offer for sale, and this can be accomplished only by

candling. In commercial packing plants the candling should be done by expert candlers in rooms maintained at a temperature of not over 65° F. The "candle" used should consist of an electric

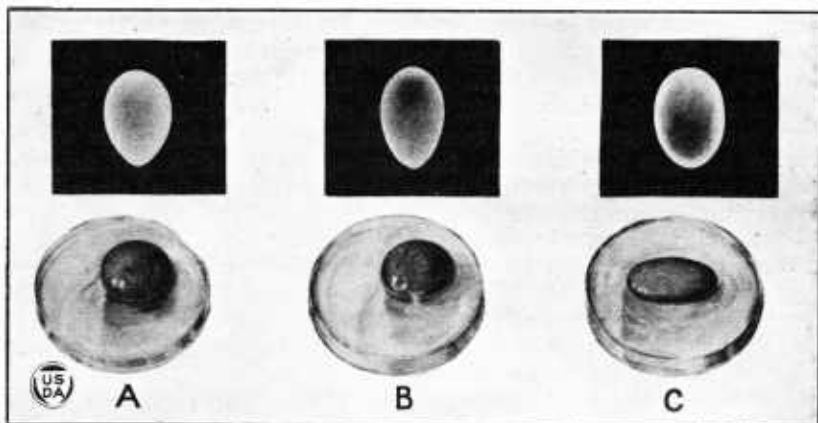


FIG. 11.—The common classes of edible eggs show differences, both before the candle and when broken out, which serve to distinguish them readily. *A*, fresh egg showing strong, well-rounded yolk; *B*, heated egg showing germ development; *C*, stale egg showing weak, flattened yolk.

light bulb inclosed in a metal shield which may have one or two holes or spouts against which the eggs are held.

The expert operator stands before the light which is fastened at a convenient height, usually 38 to 44 inches from the floor, and

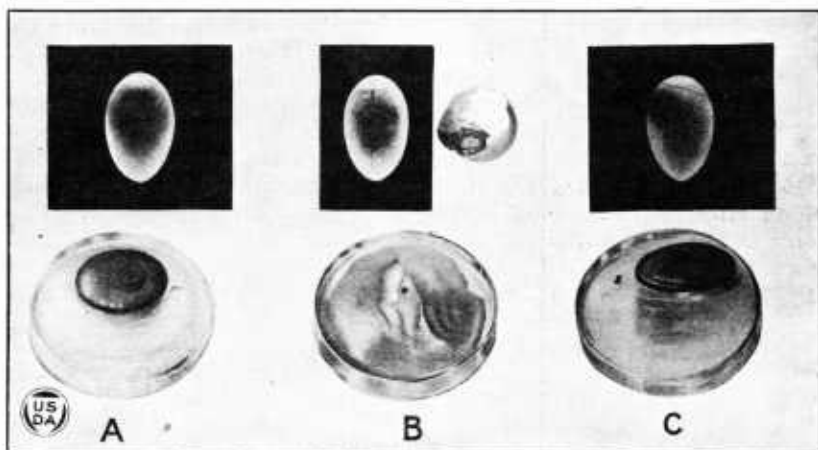


FIG. 12.—These are common types of inedible eggs distinguishable before the candle. *A*, blood ring; *B*, moldy cracked egg; *C*, egg with yolk beginning to adhere to shell.

handles the eggs very rapidly. At his side, or directly in front on a shelf 22 to 26 inches high, is placed the case of eggs to be candled. After removing the top padding and flat, the candler lifts the first filler out of the case, leaving the eggs lying loose on the next flat.

He picks up the eggs two in each hand. After candling one egg in each hand, by a quick manipulation of the thumb and fingers he reverses the position of the eggs and candles the other egg. (See fig.10.) As the eggs are candled their quality is determined and they are placed in the proper cases for each different grade. In repacking the eggs new fillers and flats are used, supplies of which are kept on a shelf above the light. The average candler, working at a steady pace but without undue effort, candles close to 25 or more cases of eggs in a 10-hour working day, which is an average rate of 15 eggs per minute. Storage eggs and others of uncertain quality are usually recandled the year round in the final distributing and consuming markets before they are offered to the retail trade.

In learning to candle eggs the eye must be trained to look for certain things and to note them quickly. The points to be observed are condition of shell, density and mobility of yolk, weakness and clearness of white, visibility and size of germ, and size, position, and outline of air cell. Frequent checking up of the candler's judgment by breaking out eggs, particularly those about which there is doubt, will prove very instructive and will aid the beginner to acquire confidence and skill.

GRADING.

Grading of eggs is merely a process of sorting them according to quality and of packing each quality in separate containers.

The grading of eggs by producers is simple and should never be neglected. It consists of throwing out all eggs which are unsuitable for food, and also of sorting out those which by reason of their small or large size, or dirty or cracked condition are unsuitable for market but which when wholesome should be retained for home consumption or for sale to local retail trade. If every farmer practiced this simple method of grading, much of the trouble and loss involved in the handling of eggs commercially would be eliminated, and the general quality of the market egg would be improved.

In the regular commercial channels, eggs are graded at the point where they are packed for shipment to market which usually is at the packing plant. This is often the first time they are graded. Candling, grading, and packing are done in a single operation. As the condition and quality of the egg are ascertained by candling and its grade is determined it is packed in the case assigned to that particular grade. Grading on a commercial scale is usually done before an electric light.

Occasionally where eggs are graded for a particularly fancy trade they are taken into the daylight for grading after they have been candled in order to secure the highest possible degree of uniformity in color and cleanliness.

When disputes arise about the grade of eggs delivered in the large markets official inspectors appointed by the exchange handling this commodity make inspection and certify the grade. Certain standard fees are charged for this service.

COMMERCIAL GRADES.

When eggs are received at the various markets their quality may vary widely as a result of the conditions under which they have been produced and handled. In order to provide a practical basis for reporting prices and also for the conduct of trading it is necessary to establish certain standards based on commercial quality and to grade according to these standards. At the present time each market has its own grades, with the result that there is a decided lack of uniformity throughout the country. A grade name in one market may not signify the same quality as the same name does in another. For example, according to the official Chicago market grades, the second grade of Fresh Gathered eggs is called Fresh Gathered Firsts, while Fresh Gathered Firsts is the third grade of Fresh Gathered Eggs as defined by the New York Mercantile Exchange and of a lower quality. Such a lack of uniformity in grades causes more or less confusion and uncertainty, especially in trading between widely separated markets and in comparing market quotations of different markets.

Results of the use of uniform grades in the marketing of many other agricultural products seem to show that the use of such uniform grades in the egg trade would tend to promote a more perfect reflection of true values in all markets, would stimulate a freer trade between distant markets and would help to create confidence and eliminate confusion in marketing.

In all markets eggs are divided into two general classes based upon freshness: Fresh, or Fresh Gathered, and Refrigerator, or Storage. Fresh eggs are those which are received at the market within a reasonable time after they are laid and which are in a sweet, full condition. Refrigerator eggs are those which have been in cold storage under conditions which require them to be branded and sold as cold storage or refrigerator eggs.

In some markets a separate class is made of processed eggs, that is, eggs which have been subjected to some artificial preserving process other than cold storage. (See page 27.) In some markets a separate class is also made of short-held or held-fresh eggs. These are eggs which have not been subjected to any artificial preserving process, and which have not been in cold storage a sufficient length of time to require their sale as refrigerator eggs but which may not have reached the market promptly or may have been held under moderate refrigeration for a short time and therefore do not conform to the requirements for either Fresh Gathered eggs or Storage Eggs.

In addition to the division into classes, a division is also made on the basis of method of packing. "Storage packed" eggs are those which are packed especially for storage in new cases made of odorless whitewood with new fillers and flats, weighing $3\frac{1}{2}$ pounds or more to the set. "Standard packed" eggs allow a wider range of wood in the packing cases with fillers and flats, usually of not less than $3\frac{1}{2}$ pounds. Other packs are recognized, including eggs "in shipping cases," which may allow the use of good secondhand cases but which

should always require new fillers and flats of medium grade or better.

The various classes of eggs are further divided into grades based upon quality. The highest grade is composed of eggs of the best quality, other grades being successively lower according to the lower quality of the eggs of which they are composed. Subgrades are often recognized, being based upon the net weight of the eggs per case.

In addition to hen eggs, duck, goose, and guinea eggs are received on some markets in considerable quantities. Duck eggs are usually quoted separately with differences in their quality reflected by different prices. Sometimes duck eggs are quoted according to the point of origin, e. g., "Duck eggs, southern" and "duck eggs, western."

Goose eggs are received in much more limited quantities, and are quoted in a single grade. The price quotation depends upon their condition and the supply.

Guinea eggs are not often quoted as such. They are more likely to be received mixed with hen eggs, particularly in the South, and are often marketed in one of the lower grades of hen eggs.

Certain classes and grades of eggs have been established by the National Poultry, Butter, and Egg Association. Two grades are defined below as samples of present commercial grades.

This association provides that:

Eggs shall be classed as Fresh Gathered, Storage Packed, and Refrigerator, also that they shall be graded as Extra Firsts, Firsts, Seconds, Dirties, and Checks.

It specifies that:

Fresh Gathered Extra Firsts (between June 1 and December 1, only) shall be packed in new or standard 30-dozen cases, unless otherwise specified at time of sale; shall consist of clean, fresh, reasonably full, strong, sweet eggs, 60 per cent, and net average weight 44 pounds or over; no case of sample inspected to weigh less than 43 pounds. The balance, other than the loss, may be defective in strength or fullness, but must be sweet. There may be a total average loss of 2 dozen per case; and of this average loss, the loss in bad eggs must not exceed nine eggs.

It also specifies that:

Storage Packed Firsts must meet the usual packing requirements of eggs for storage and shall grade as follows: From March 15 to May 31, 70 per cent clean, fresh, reasonably full, 43 pounds average net weight; no case of sample inspected to weigh less than 42 pounds. Balance of the year, 55 per cent clean, fresh, reasonably full, 43 pounds net weight; no case of sample inspected to weigh less than 42 pounds. March 15 to May 31, the total average loss must not exceed one and one-half dozen, and of the loss there must not be over twelve (12) checks per case, and the bad and leaky eggs must not exceed one-half dozen. Balance of year the loss must not exceed two (2) dozen per case. Of this loss the leaky, bad, or rotten must not exceed nine (9) eggs per case.

In defining loss the association states:

Loss, as usual, shall comprise all rotten, broken (leaking), spots, broken yolked, frozen (split), hatched (blood-veined), and sour eggs. Very small, very dirty, cracked (not leaking), badly heated, badly shrunken, salted, and chilled eggs shall be counted one-third loss in all grades except Seconds, Dirties, and Checks.

EGG PACKAGES.

THE CARTON.

The smallest unit package used for eggs is the carton. It is a pasteboard package with a capacity of 1 dozen eggs, and is used very generally by retail trade. Cartons are made in two styles, one known as the "3 by 4," holding 3 rows of 4 eggs each, and the other as the "2 by 6" holding 2 rows of 6 eggs each. The latter style is much more commonly used, and will pack in ordinary 30-dozen egg cases. The carton is equipped with a filler similar to that used in the regulation, egg case.

Carton packages are not used by producers unless they are selling direct to the consumer. As a rule, it is not wise to ship eggs packed in cartons, for the reason that if an egg is broken the entire package is spoiled and has to be repacked. When catering to an exceptionally high-class retail trade, each individual egg in the carton is sometimes wrapped in waxed paper. If an egg becomes broken this wrapping retains the contents and does not allow it to soil other eggs in the carton.

THE EGG CASE.

The producer who ships his eggs generally uses the standard 30-dozen case which is used by packers. Cases used by producers are often secondhand, while those used by dealers or packers should always be new. The 30-dozen case is manufactured by firms that specialize in this business. They are shipped knocked down and are put together in the packing plants where they are used.

The standard 30-dozen case is 13 inches high, 12 inches wide, and 25 inches long, with a partition in the center extending from side to side, and dividing the case into two equal, square compartments with a capacity of 15 dozen each. The cases are made as light as possible while still having the requisite strength and must conform to the requirements of the Express and Consolidated Freight Classification. The sides, top, and bottom are made of $\frac{3}{8}$ -inch material while the partition and the ends are $\frac{7}{8}$ -inch. It is important that the center board be in the true center of the case so that the two compartments will be of equal and proper size and the eggs and packing will have neither too little nor too much room.

In nailing the cases together 3-penny, cement-coated, large-headed nails are used as follows: For a flush cleat case—18 on the side (6 in each end and 6 in the center), 21 on the bottom (7 in each end and 7 in the center), 8 on the top (4 in each end and none in the center); for a drop cleat case—6 for the top (3 in each end and none in the center). (See fig. 13.) Each case must be equipped with fillers and flats; pads also may be used. Various other styles of shipping cases of different capacities are manufactured but they are used only to a limited extent.

FILLERS AND FLATS.

The ordinary filler is made of strawboard and contains 36 square cells arranged in a square with 6 on a side. Five fillers, each hold-

ing 3 dozen eggs, are used in each side of the case, or 10 fillers in all. Fillers of this style are commonly called honeycomb fillers though the real honeycomb filler is made up of six-sided cells. Other special style fillers have been devised with the idea of carrying the eggs more perfectly.

When duck eggs are shipped in regulation 30-dozen cases a special filler is used. These are identical in construction with the standard filler, except that the cells are larger and there are only 25 cells to a filler instead of 36.

The strawboard used in fillers and flats should be of good weight, hard-calendared in finish and perfectly dry. Strawboard fillers weakened from use and, though they may appear to be in good condition, should not be used the second time. Molded pulp board fillers can be used as long as they stay in good condition. The usual flats

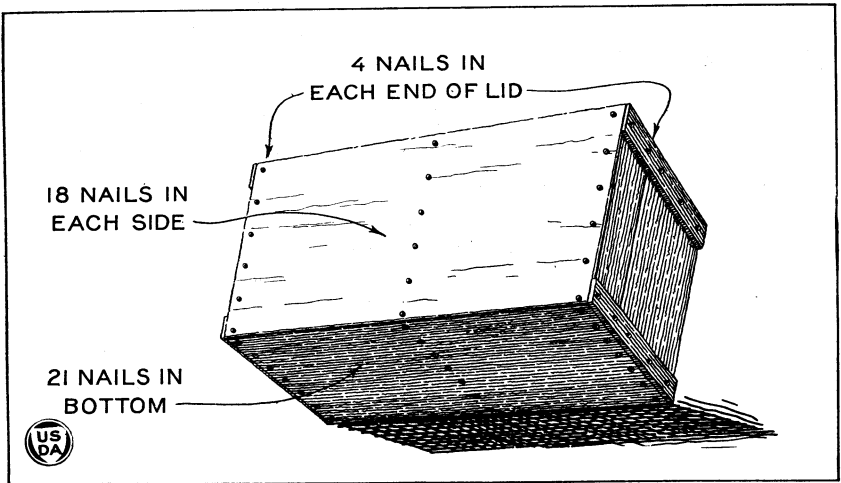


FIG. 13.—A properly constructed egg case must be well nailed.

are merely square pieces of strawboard, the size of the egg case compartment, and are used between the fillers. In a case packed with loose padding, 12 flats are required to the case. Where excelsior pads are used, only six flats are required, since the flat is omitted wherever a pad is used.

There are two grades of strawboard fillers and flats in common use which have the following specified weights per set: $3\frac{1}{2}$ -pound, $3\frac{1}{2}$ pounds per set, and No. 1, $3\frac{3}{4}$ to 4 pounds per set. Fillers of lighter weight are manufactured to some extent and, were formerly commonly used, but because they do not give so good results, their manufacture and use have been largely discontinued.

Improved methods of packing to reduce breakage have brought excelsior pads into extensive use. These pads are about one-third of an inch thick and are made of excelsior wrapped with paper. They are the size of the egg case compartment and for best results six of them are used to the case.

PARCEL-POST PACKAGES.

Parcel-post packages must be substantial in order to protect the eggs properly and at the same time they must be as light as possible

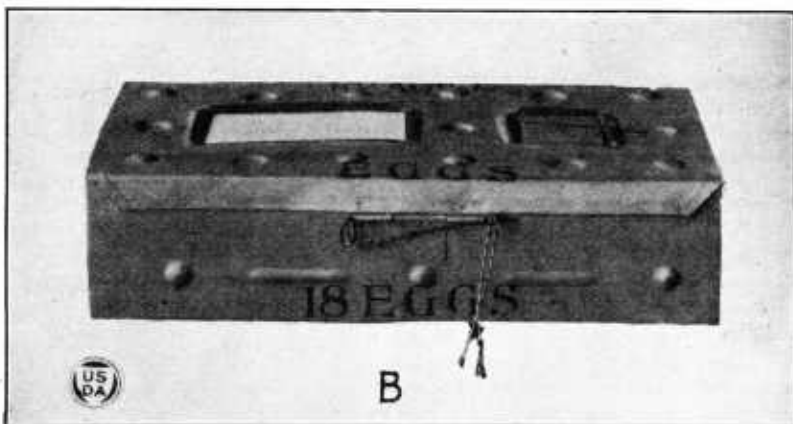
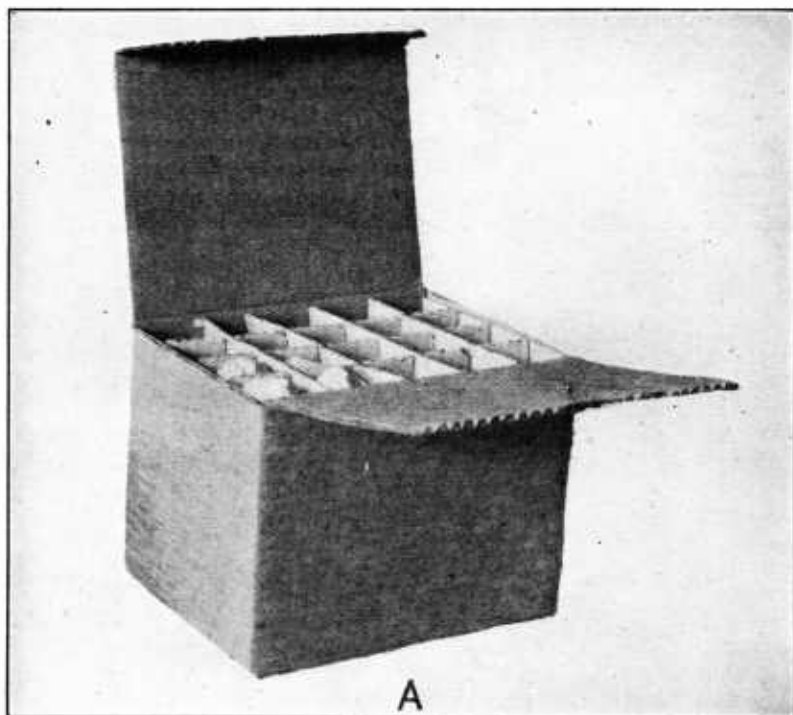


FIG. 14.—Shipment of eggs by parcel post requires strong light containers. A, corrugated pasteboard container; B, metal container.

to reduce postage costs. Special parcel-post packages are made in various sizes with capacities of from one to several dozen eggs. Where the packages are not likely to be returned to the shipper, the

cheaper styles made of corrugated pasteboard are most commonly used. Where the packages are returned, more substantial types, often made of metal, are more common. (See fig. 14.) The ordinary 30-dozen case, when in good condition and properly packed, is also receivable by the postal authorities for the parcel-post shipment of eggs and is used to a considerable extent.

PACKING EGGS.

The purpose in packing eggs is to furnish a convenient means of handling them, and also to prevent breakage during shipment. Too often farmers or egg producers pack their eggs carelessly.

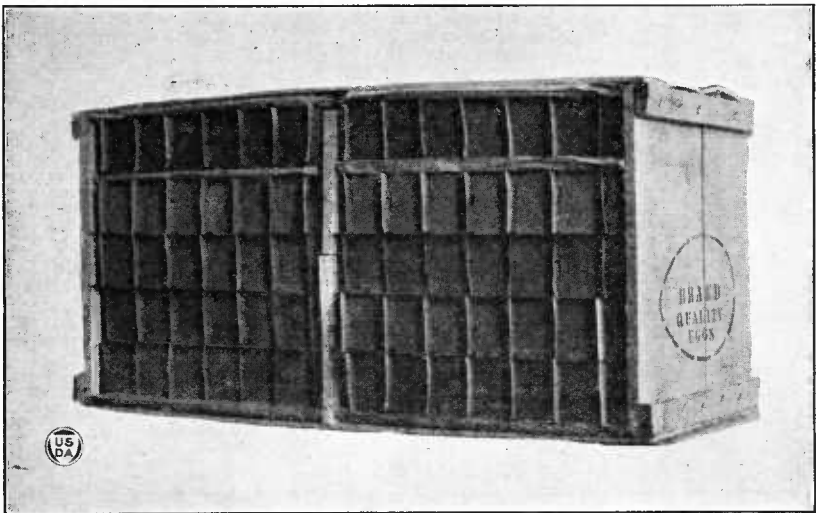


FIG. 15.—An egg case packed with standard fillers and flats and with three excelsior pads to a side is a very satisfactory method of packing. Where pads are used flats are omitted.

The postal requirements for mailing market eggs are as follows:

Eggs shall be accepted for mailing when packed in crates, boxes, baskets, or other suitable containers so constructed as properly to protect the contents. Such packages to be transported outside of mail bags. All parcels containing eggs shall be plainly marked "Eggs." When necessary, they shall be marked "This side up."

When the eggs are mailed in special parcel post packages they must be carefully packed by wrapping each egg in paper, or by other means, so that they will not shake or shift around in the package. Failure to do this is almost sure to result in breakage.

Where second-hand 30-dozen cases are used, either for parcel post or express shipment, they must be gone over thoroughly to see that they are in good condition and properly nailed. Old fillers and flats, even though apparently in good condition, should never be used as they will not protect the eggs properly. The express classification also specifies that second-hand cases must be strapped with heavy wire or flat metal bands which must extend over the sides and bottom at each end but not over the top.

In order to pack eggs properly, a layer of excelsior about one-half inch deep is evenly spread in the bottom of the case and not left as a wad in the center. On top of this layer are placed a flat and a filler. The filler is filled with eggs packed with the large end up and a flat is placed over it. This process is continued until the case is filled. On top of the top layer a flat is placed and over this an even covering one-half inch thick of excelsior, such as is used in the bottom. (See fig. 16.) The bunching of the excelsior in the center of the flat is a bad practice which is likely to cause breakage.

Where excelsior pads are used, one should be placed at the bottom of the case, one inserted between the top and the next to the top fillers in place of the flat, and one placed on top of the top layer, omitting the loose padding and the flat whenever a pad is used. (See fig. 15.) To facilitate inspection of the top layer of eggs, the excelsior pad

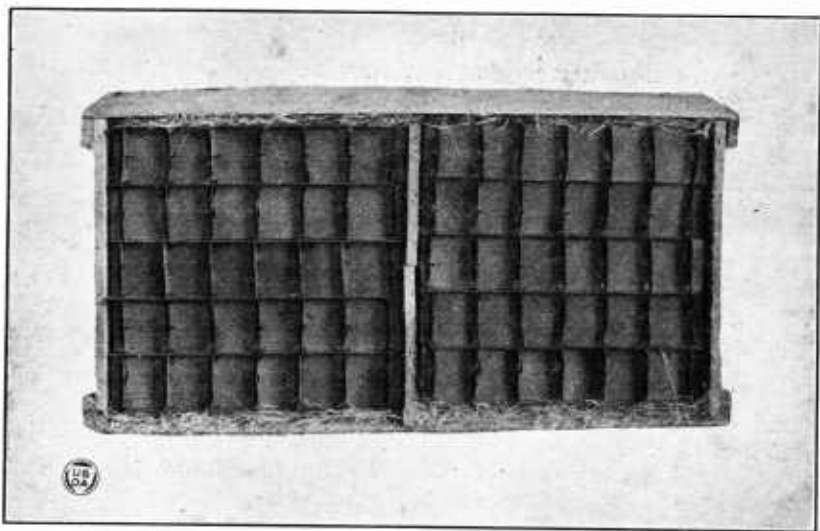


FIG. 16.—Instead of using excelsior pads loose excelsior may be evenly spread at the top and bottom of the egg case.

may be placed between the second and third layers and an ordinary flat used under the top layer which makes it easier to lift out that layer. Packing the case with six pads in the way indicated is the most satisfactory method of packing with the standard fillers. The packing must be sufficient in amount to fill the case completely and hold the fillers firmly in place to prevent shifting and breakage.

The top is then nailed on using the number of nails indicated in Figure 13 but being particular not to nail the cover at the center. The packing will cause a slight bulge at the center of the top which provides some elasticity and is useful in helping to take up shipping shocks. The case must be plainly labeled with the name and address of the party to whom it is shipped, together with the name and address of the shipper. Tags or labels containing this information should be pasted or nailed on each end of the case rather than on the top as in the former position they are protected by the end cleats.

At the packing house the cases are assembled from the knockdown stock on forms used for this purpose. New flats and fillers should always be used. The eggs are packed at the same time that they are candled and graded, being placed in the final shipping cases by the candler. The packing is then completed by other hands. Where eggs are shipped in carload lots, it is not necessary to place the name and address of the consignee on the cases. Progressive egg packers and cooperative producers' organizations who desire to establish a reputation for a high-class brand find it to their advantage to stencil their brands on the ends of the cases.

SHIPPING EGGS.

BY PARCEL POST.

Parcel post shipment of market eggs is to a considerable extent a retail proposition utilized by producers who furnish eggs at regular intervals in comparatively small lots to individual consumers. To a considerable extent, also, cases of eggs are shipped by parcel post from producers and from country shippers to wholesale dealers and retailers. In cases of emergency, where express and freight shipping facilities are tied up, case shipments by parcel post may be very widely used. Parcel post shipment of market eggs is generally limited to shipments within the second zone, for it does not pay, as a rule, to ship eggs long distances by this method. Both because the weight of the container is greater per dozen eggs in a small package than in a larger one and also because the postage charge for the initial pound is greater than for each subsequent pound, it is more economical to ship eggs by parcel post in lots of more than 1 dozen.

The postage rate is the same to all points within the first and second zones, or, in other words, within a radius of 150 miles from the sending post office. The rate is 5 cents for the first pound and 1 cent for each additional pound. A simple method of determining the postage on a parcel not going beyond the second zone is to add 4 to the number of pounds which it weighs, the resultant sum being the amount of postage required in cents. Local parcel post rates are in force which apply to parcels that do not go beyond the jurisdiction of the mailing office and which are lower than the rates for the first and second zones. These rates are 5 cents for the first pound and 1 cent for each additional 2 pounds or fraction thereof. Since very few parcel post shipments of eggs originate and end within the jurisdiction of the same office, producers can not often take advantage of these local rates.

Parcel post shipments of eggs may be insured against loss or breakage the same as other merchandise and it is usually desirable to do so. Insured packages are likely to receive more careful handling than those not insured, and it is of more importance to the shipper to have the eggs go through without breakage than it is to be able to recover for damage.

BY EXPRESS.

Shipments by express are generally in lots of one or several cases. On account of the greater expense of shipment by this means over freight shipment, it is commonly employed for comparatively short

distances. In shipping by express the requirements of the express companies must be carefully studied and complied with, otherwise claims for loss and damage will not be allowed. When express shipments may be made either by day or night, it is preferable to ship at night especially during the hot weather, since the night temperatures are more favorable to good quality in the eggs. Whether shipped by express or freight, shippers should be careful to see that the eggs are not left on the station platform for several hours exposed to the hot summer sun while waiting for the train. Such treatment will cause a serious deterioration, particularly in fertile eggs, for the hot temperature is very likely to cause development of the embryo. The eggs should be placed under cover where they will be protected from both sun and rain.

BY FREIGHT.

Shipments by freight are usually of two kinds, the local pick-up freight and the through car-lot shipment. The pick-up freight service takes the eggs from the small points in comparatively small lots and delivers them at the packing house or other concentrating point. At this point, after they have been candled, graded, and repacked, they are ready for shipment to their final market. Such a shipment should be made, whenever possible, in car lots in refrigerator cars. The cases of eggs should be thoroughly chilled before they are loaded in the car. The car should be iced, using crushed ice without salt, and the temperature reduced to below 40° F. before loading is begun.

When the door is opened for loading, a canvas with a slit in it to allow the passage of the men with the cases should be hung over the door. This will help to retain the cool air and to prevent an undue rise of temperature. The egg cases are loaded in rows lengthwise in the car. The usual refrigerator car will accommodate 14 or 15 cases placed end to end lengthwise and 8 rows across. The car should not be loaded more than 4 layers deep. Shifting of the load is one of the most serious causes of egg breakage in car-lot shipments. To prevent this, a great deal of care must be taken to see that the spaces between the ends of the cases and the ice bunkers, or any other empty spaces between the cases and the car, are tightly stuffed with straw so that there will be no room for the cases to shift. If any space is left between the cases at the center of the car when the load is completed, this must be carefully braced or buffed with straw.

If the car is loaded with an incomplete top layer, the cases of the next lower layer at the end and along the side of this incomplete layer should be raised 2 or 3 inches by means of frames set under them. The projecting top edges of these cases will then engage the lower edges of the cases in the incomplete layer and in this way hold them firmly in place and prevent shifting.

Four hundred cases is generally considered a carload of eggs, although the number actually stowed in a car may be somewhat more or less. Refrigerator cars, as they proceed on their way to market, are iced en route as may be necessary and in accordance with the shipper's instructions at icing stations maintained by the railroad companies. The insulation of the refrigerator car not only

makes it possible to maintain a low temperature in the summer months by using ice, but also when used without ice in the winter it protects the eggs from chilling or freezing during periods of severe weather.

It is decidedly preferable to ship eggs in car lots unmixed with other produce. It sometimes becomes necessary, however, to ship a partial car of eggs together with tubs of butter or with boxes or barrels of dressed poultry. Under these conditions, it is necessary to brace the different parts of the load separately and very strongly to prevent damage to the eggs. When dressed poultry is shipped with eggs, it is best to load the packages of poultry at the ends of the car next to the ice bunkers and to load the cases of eggs at the center of the car and toward the top of the load. When this is done, the ice used in the bunkers may be salted to produce lower temperatures at the ends of the car and along the floor where the dressed poultry is located. If the ice is salted and the positions of the produce in the load is reversed, frozen eggs may result next to the bunkers and the poultry at the center of the car may be damaged because of too high temperature at that point.

PRESERVATION AND COLD STORAGE OF EGGS.

HOME PRESERVATION.

For household use, various methods of preservation are employed. Chief among them are the waterglass method and the limewater method. The only use which producers should make of these methods of preservation is to carry a supply of cheaper eggs over the summer for home use in the fall so that all of the higher-priced fresh eggs produced at that time can be sold. Preserved eggs should never be offered for sale by the producer as anything except preserved eggs.

COLD STORAGE.

The principal commercial method of preserving eggs is cold storage. Eggs which are intended for storage should be carefully graded and packed in new cases made of odorless wood and in new fillers of $3\frac{1}{2}$ -pound weight or better.

Storage rooms for eggs must be utilized for this purpose exclusively. Other products can not be stored with eggs on account of the danger of imparting undesirable flavors or odors to them. The temperature of an egg-storage room should be maintained within a range of 29° to 32° F., the humidity should range from 82 to 85 per cent. The cases are stacked one upon another using strips between to allow freer circulation of air. The room itself must be kept in a sweet, clean condition. This can be accomplished by liming the floors and by whitewashing the walls after each storage season.

There are various State regulations with reference to the cold storage of eggs. Most of these have to do with the length of time that eggs can be kept in storage, the length of time they may be temporarily held in storage without being termed storage eggs (usually 30 days or less), marking the cases with the date on which they went into storage and the date when withdrawn, and the sale of cold-storage eggs only as such.

PROCESSING.

Recently a preserving method termed "processing" or "sterilizing" has been perfected and some market eggs are treated by it. This process consists of dipping the eggs for a few seconds in a solution of mineral oil heated to a temperature of 225 to 240° F., which is supposed to seal the pores in the shell and thus prevent to a large extent the evaporation of water from the egg. Most of the processed eggs are placed in cold storage if they are to be held for any length of time. The process, therefore, is not primarily designed to replace cold storage but rather to prevent deterioration in the quality of cold-storage eggs.

FROZEN EGGS.

As eggs come into the packing houses there are always a certain number which are damaged by breakage, which are dirty, or which are so weak that they will not stand shipment to market and arrive in good condition. In order to save these eggs some establishments make a practice of breaking them out of the shell and freezing them, in which condition they can be held for a long time. As the eggs suitable for this purpose are located by the candlers they are placed in pails or other containers and carried to the breaking room. This room should be well lighted, provided with refrigeration, and maintained at a temperature not over 65° F. It must be so built and equipped that it can be kept clean and sanitary. If the bacterial content of the frozen product is to be kept at a minimum, every precaution must be taken to prevent bacterial contamination of the good eggs by any bad ones present in the breaking stock.

The eggs are broken out by operators who are mostly girls or women. Each egg as broken is dropped into a glass cup where it can be inspected, smelled, and sometimes tasted to see that it is suitable for freezing. As soon as two or three good eggs are accumulated in a cup they are emptied into a larger container. In case a bad egg is dropped into the cup it is necessary to discard any good eggs which may be in the cup at that time. Any of the apparatus used which comes in contact with a bad egg is immediately removed to an adjoining room where it is thoroughly sterilized before being used again. The eggs as broken may be separated into whites and yolks or may be left in a mixed condition. As the broken eggs accumulate they are dumped into a churn where they are thoroughly agitated so as to secure a uniform mixture. They are then drawn off into their final containers, which are most commonly 30-pound cans. These cans are immediately taken to a sharp freezer where a temperature from 0° to 10° F. is maintained and there the contents are frozen solid. The frozen eggs are held and shipped in this condition and should not be thawed until they are used. Frozen eggs are utilized principally by bakers and confectioners.

**POINTS FOR THE PRODUCER TO REMEMBER IN
MARKETING EGGS.**

Keep strong, healthy, vigorous stock and care for it properly.

Provide plenty of clean nests for the laying hens.

Gather eggs twice a day.

Keep the eggs in a cool, fairly dry place.

Keep out the cracked, dirty, small, and very large eggs for home use.

Never wash eggs unless they are to be used immediately by local trade.

Market eggs frequently, at least once a week and preferably twice.

Know the preferences of your market and strive to meet them.

Grade your eggs for uniformity in size, shape, and color.

Know the shipping requirements of express or railroad companies when you use their services.

Use only sound, strong, standard packages and pack the eggs properly.

Remember quality is essential for best prices.

If you are selling through a satisfactory agency with which you have established a reputation for high quality, be very sure that you have secured a better outlet before you make a change.

If you sell to local dealers, insist upon their buying eggs on a "loss off" or quality basis.

**ORGANIZATION OF THE
UNITED STATES DEPARTMENT OF AGRICULTURE.**

January 5, 1924.

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29

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